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Biological aspects of *Nurscia albomaculata* (Lucas, 1846) (Arachnida: Araneida: Titanoecidae) in Egypt

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Abstract

Nurscia albomaculata (Lucas, 1846), family Titanoecidae, was collected from greenhouses in Dokki, Giza. Its life cycle was studied in laboratory. It had 5-6 spiderling instars before adulthood for both males and females. Different instars were reared on different stages of larvae of cotton leaf worm. Food consumption was also noticed, in addition to some biological and ethological aspects.

Keywords: Life cycle, Feeding, Spiders, Titanoecidae, *Nurscia albomaculata*, Egypt.

Introduction

Family Titanoecidae Lehtinen, 1967 includes 5 genera and 44 species all over the world (Platnick, 2003). In Egypt, two species of two genera of this family were recorded: *Nurscia albomaculata* (Lucas, 1846) and *Titanoeca tristis* L. Koch, 1872 (El-Hennawy, 1990, 2002a & 2002b). *N. albomaculata* is one of four species of genus *Nurscia* Simon, 1874, recorded from Portugal to Japan (Platnick, 2003).

N. albomaculata was recorded from Alexandria in northern Egypt (El-Hennawy, 2002a). It was found in different parts of Nile Delta (HE). It was also encountered in greenhouses of some vegetable plants (cucumber, pepper and tomato) and in cultivated fields in several governorates. *N. albomaculata* was found to be the dominant ground species in greenhouses. There is no studies on it. Therefore, it is necessary to study its life cycle and to try to know its role in the agroecosystem, specially in greenhouses.

Material and Methods

Alive spiders of *Nurscia albomaculata* (Lucas, 1846) were individually picked up with the hands from plastic greenhouses of pepper (*Capsicum annum*) which belong to Central Greenhouses of the Ministry of Agriculture, Dokki, Giza. Those individuals were found inside their silk tunnels among plants near the connections of the roots with the stems, immediately on soil surface, and under clusters of clay which cover the roots of the plants. The collected specimens were found in different age stages in addition to adults. Some egg sacs were found attached to the silk tunnels of the adult females and were also collected. The egg sacs were kept in plastic vials in the laboratory until eggs' hatching.

All collected specimens and hatched spiderlings, inside laboratory, were individually reared by the first author (GS) and fed, every two days, on different stages of larvae of cotton leaf worm, *Spodoptera littoralis* (Boisduval, 1833), under laboratory conditions, 26-28^{o}C and 60-70% R.H. The spider species was identified by the second author (HE).

Results and Discussion

Egg sacs, Eggs and Incubation period

Egg sacs were circular in shape and white in colour. They were usually covered by soil particles. This may be a kind of camouflage for protection. The egg sacs which were constructed in laboratory were rosy white in colour.

Ten egg sacs were collected from greenhouses (7 May - 26 June 2002). The range of number of eggs was 19–30. Average number of eggs per egg sac was 24.3 ± 4.35 eggs.

Three females, collected on 26th June 2002, laid eggs in captivity; 1. 29/6, 18 eggs, which hatched on 13th July, 2. 1/7, 20 eggs, 3. 6/7, 21 eggs, 4. 17/7, 25 eggs. The last two egg sacs were of the same mother. The eggs of those four egg sacs, except the first one, did not hatch. Average number of eggs laid in laboratory per egg sac, 21 ± 2.94 eggs, was slightly fewer than those laid in greenhouses. A laboratory reared female laid egg mass on 14th December, at the age of 91 days, without mating and eggs did not hatch.

Incubation period of eggs of *N. albomaculata* lasted for 14 days under laboratory conditions. Only one case was observed.

Spiderlings

Few egg sacs were collected from greenhouses and their eggs hatched in the laboratory between 19th May and 6th July. Hatched spiderlings of two of them were successfully reared. Most of the hatched individuals of other sacs died in early stages. After hatching, the spiderlings were very active and able to capture their prey. They passed through five or six instars to either male or female during their development.

The duration of instar was longer during the instars 1-3 of female than those of the male while it was shorter during the instars 4-6. Generally, males needed longer durations than females before reaching maturity. The duration of different stages of *N. albomaculata* in laboratory was recorded in Table (1).

During rearing 20 individual spiderlings of one egg sac of *N. abomaculata*, 4 individuals died before reaching maturity, i.e. Mortality before maturity = 20%; 1 died at 2nd instar, 1 died at 3rd instar, and 2 died at 6th instar. Those individuals were excluded from the calculation of instars' duration. The remaining 16 individuals reached maturity; 8 males (50%) and 8 females (50%). Sex ratio = 1 : 1 or ♂/♀ = 1.00. Half the males reached maturity after five moults and the other half after six moults (1 : 1) while 37.5% of the females reached maturity after five moults and 62.5% after six moults. The mean life cycle duration was nearly the same for male and female (about 108-109 days).

Once, an adult female moulted twice after being adult. It is known that "For most spider the last molt marks the transition to sexual maturity; only in some exceptional cases do adult spiders still molt further" (Foelix, 1996). Kraus & Kraus (1988) stated that adult males and females of the cribellate eresid genus *Stegodyphus* may pass a "post-adult moulting". This single case of the cribellate titanoecid *Nurscia* is another "post-adult moulting" case.

Table 1: Duration of different stages of *Nurscia albomaculata* (Lucas, 1846).

Developmental stage	Duration (days)					
	Male			Female		
	Range	Mean	S.D.	Range	Mean	S.D.
1st instar	11-35	17.69	6.142	16-37	22.33	7.215
2nd instar	7-35	18.85	7.116	7-35	20.08	7.960
3rd instar	12-23	17.69	3.794	7-23	16.08	5.107
4th instar	9-44	20.38	9.794	9-24	16	4.862
5th instar	11-47	19.92	10.882	9-41	21.64	10.240
6th instar	11-47	27.57	14.616	10-51	24.14	14.416
Life cycle	81-149	109.38	26.937	70-149	108.42	23.333
Adult longevity	24-140	69.67	45.820	120-189	144.42	22.956
Life span	105-266	181.89	65.910	153-287	244.5	35.184

Adult longevity and Life span

Adult females lived longer than males; nearly twice (about 144 against 70 days). Life span of females was also longer than that of males (about 244 against 182 days). Males died between October and March while females died between December and April.

Food consumption

During the study of food consumption of *N. albomaculata*, different spiderling instars and adults were fed on various instars of *S. littoralis* larvae. Both first and second instars of spiderlins were fed on the first instar of *S. littoralis*. Third instar spiderlings were fed on the second instar of prey and fourth instar spiderlings were fed on its third instar. The fifth and sixth instars of spiderlings as well as adults were fed on the fourth instar of the prey. The average number of consumed prey and the daily rate of consumption increased during last instars, i.e. 4th-6th, more than during early instars, 1st-3rd.

Table 2: Food consumption of different stages of *Nurscia abomaculata* (Lucas, 1846).

Developmental stage	Prey* instar	Male				Female			
		Total			Daily rate	Total			Daily rate
		Range	Mean	S.D.		Range	Mean	S.D.	
1st instar	1st	15.5-33	23.69	6.28	1.34	17.5-40	26.83	8.44	1.20
2nd instar		11.5-38.2	18.48	7.88	0.98	15-37.5	23.12	7.0	1.15
3rd instar	2nd	15-35	23.50	6.76	1.33	7.5-97.5	30.42	23.71	1.89
4th instar	3rd	20-90	38.65	20.33	1.90	20-70	31.87	14.31	1.99
5th instar	4th	20-80	40	18.37	2.01	15-85	40.04	19.63	1.85
6th instar		20-80	49.17	24.78	1.78	25-80	46.57	20.47	1.93
Adult		20-100	51.25	25.77	0.74	15-165	87.29	42.12	0.60

* Different stages of larvae of cotton leaf worm, *Spodoptera littoralis* (Boisduval, 1833).

Biological and Ethological Notes

1- Some trials were carried out to observe the mating behaviour between a laboratory reared female and a field captured male. No mating was observed but three females laid eggs.

2- Seven couples of male and female were observed to find that in five cases the female devoured the male. In the other two cases the male devoured the female.

3- No cannibalism was observed in the immature stages.

4- When the temperature of the incubator was accidentally decreased to –7°C for about 24 hours, the individuals became dormant. After returning to laboratory conditions, they restored their activity. This suggest that they may tolerate a wide range of temperature in nature.

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